



UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/507,273	09/03/2004	Avto Tavkhelidze	12078	4003
7590 08/23/2006				
Borealis Technical Limited 23545 NW Skyline Blvd North Plains, OR 97133-9205			EXAMINER HINES, ANNE M	
			ART UNIT 2879	PAPER NUMBER
DATE MAILED: 08/23/2006				

Please find below and/or attached an Office communication concerning this application or proceeding.

Advisory Action Before the Filing of an Appeal Brief	Application No.	Applicant(s)	
	10/507,273	TAVKHELIDZE ET AL.	
	Examiner	Art Unit	
	Anne M. Hines	2879	

--The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

THE REPLY FILED 08 August 2006 FAILS TO PLACE THIS APPLICATION IN CONDITION FOR ALLOWANCE.

1. ☒ The reply was filed after a final rejection, but prior to or on the same day as filing a Notice of Appeal. To avoid abandonment of this application, applicant must timely file one of the following replies: (1) an amendment, affidavit, or other evidence, which places the application in condition for allowance; (2) a Notice of Appeal (with appeal fee) in compliance with 37 CFR 41.31; or (3) a Request for Continued Examination (RCE) in compliance with 37 CFR 1.114. The reply must be filed within one of the following time periods:

- a) ☐ The period for reply expires _____ months from the mailing date of the final rejection.
b) ☒ The period for reply expires on: (1) the mailing date of this Advisory Action, or (2) the date set forth in the final rejection, whichever is later. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of the final rejection.

Examiner Note: If box 1 is checked, check either box (a) or (b). ONLY CHECK BOX (b) WHEN THE FIRST REPLY WAS FILED WITHIN TWO MONTHS OF THE FINAL REJECTION. See MPEP 706.07(f).

Extensions of time may be obtained under 37 CFR 1.136(a). The date on which the petition under 37 CFR 1.136(a) and the appropriate extension fee have been filed is the date for purposes of determining the period of extension and the corresponding amount of the fee. The appropriate extension fee under 37 CFR 1.17(a) is calculated from: (1) the expiration date of the shortened statutory period for reply originally set in the final Office action; or (2) as set forth in (b) above, if checked. Any reply received by the Office later than three months after the mailing date of the final rejection, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

NOTICE OF APPEAL

2. ☐ The Notice of Appeal was filed on _____. A brief in compliance with 37 CFR 41.37 must be filed within two months of the date of filing the Notice of Appeal (37 CFR 41.37(a)), or any extension thereof (37 CFR 41.37(e)), to avoid dismissal of the appeal. Since a Notice of Appeal has been filed, any reply must be filed within the time period set forth in 37 CFR 41.37(a).

AMENDMENTS

3. ☐ The proposed amendment(s) filed after a final rejection, but prior to the date of filing a brief, will not be entered because
(a) ☐ They raise new issues that would require further consideration and/or search (see NOTE below);
(b) ☐ They raise the issue of new matter (see NOTE below);
(c) ☐ They are not deemed to place the application in better form for appeal by materially reducing or simplifying the issues for appeal; and/or
(d) ☐ They present additional claims without canceling a corresponding number of finally rejected claims.

NOTE: _____. (See 37 CFR 1.116 and 41.33(a)).

4. ☐ The amendments are not in compliance with 37 CFR 1.121. See attached Notice of Non-Compliant Amendment (PTOL-324).
5. ☒ Applicant's reply has overcome the following rejection(s): rejection of claims 13 and 24.
6. ☐ Newly proposed or amended claim(s) _____ would be allowable if submitted in a separate, timely filed amendment canceling the non-allowable claim(s).
7. ☒ For purposes of appeal, the proposed amendment(s): a) ☐ will not be entered, or b) ☒ will be entered and an explanation of how the new or amended claims would be rejected is provided below or appended.
The status of the claim(s) is (or will be) as follows:
Claim(s) allowed: _____.
Claim(s) objected to: 13, 15-26.
Claim(s) rejected: 1-12.
Claim(s) withdrawn from consideration: _____.

AFFIDAVIT OR OTHER EVIDENCE

8. ☐ The affidavit or other evidence filed after a final action, but before or on the date of filing a Notice of Appeal will not be entered because applicant failed to provide a showing of good and sufficient reasons why the affidavit or other evidence is necessary and was not earlier presented. See 37 CFR 1.116(e).
9. ☐ The affidavit or other evidence filed after the date of filing a Notice of Appeal, but prior to the date of filing a brief, will not be entered because the affidavit or other evidence failed to overcome all rejections under appeal and/or appellant fails to provide a showing of good and sufficient reasons why it is necessary and was not earlier presented. See 37 CFR 41.33(d)(1).
10. ☐ The affidavit or other evidence is entered. An explanation of the status of the claims after entry is below or attached.

REQUEST FOR RECONSIDERATION/OTHER

11. ☐ The request for reconsideration has been considered but does NOT place the application in condition for allowance because: _____.
12. ☐ Note the attached Information Disclosure Statement(s). (PTO/SB/08 or PTO-1449) Paper No(s). _____
13. ☐ Other: _____.

Amtd 8/18/06

MS
MARICELI SANTIAGO
PRIMARY EXAMINER

DETAILED ACTION

Response to Amendment

The amendment filed on August 8, 2006, has been entered and acknowledged by the Examiner.

Claims 1-13 and 15-26 are pending in the instant application.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Claims 1-2, 4-5, and 8-12 are rejected under 35 U.S.C. 103(a) as being unpatentable over Fitzpatrick et al. ("Close-Spaced Thermionic Converters with Active Spacing Control and Heat-Pipe Isothermal Emitters") (of record) in view of DiMatteo et al. (US 6232546) and Nishioka et al. (US Pat. No. 4,880,975) (of record).

Regarding claims 1 and 2, Fitzpatrick teaches a diode device comprising: a first electrode attached to one end of three piezoelectric translators and a second electrode attached to the opposing end of the three piezoelectric translators and wherein the piezoelectric translators lengths are attached to controlling circuitry and modified by a signal so that the magnitude of a distance separating said electrodes is adjusted (page 926, Fig. 7; page 924). Fitzpatrick also teaches wherein three piezoelectric translators are provided in order to maintain parallel electrode surfaces (page 924). Fitzpatrick fails

to teach wherein the piezoelectric translators are a housing means and a further pair of electrodes are attached to the inner and outer faces of the housing means.

In the same field of endeavor of electrode gap control with piezoelectric actuators, DiMatteo teaches a diode device with the gap between the first and second electrodes to control the distance separating the electrodes and wherein the piezoelectric actuators are a housing means (Fig. 6, 34; Column 6, lines 14-24; Column 6, lines 33-37) in order to maintain the enhanced performance of a sub-micron gap by compensating for thermal effects on the first and second electrodes (Column 1, lines 19-33). While DiMatteo teaches that the piezoelectric actuators are attached to control circuitry, it is silent with regards to the physical location of the electrodes that attach to the actuators to the control circuitry.

In the same field of endeavor of electrode gap control with piezoelectric actuators, Nishioka teaches a piezoelectric actuator housing that is adjustable in three dimensions, like the actuator configuration of both Fitzpatrick and DiMatteo, wherein a pair of electrodes are attached to the inner and outer faces of the housing (Fig. 2, 3 & 31-35; Column 2, line 60 to Column 3, line 8; Column 4, lines 33-35) in order to provide a fine adjustment mechanism that is not susceptible to variations in the voltage applied to the actuator (Column 1, lines 60-65).

Therefore, it would have been obvious to one of ordinary skill in the art to modify the invention of Fitzpatrick to have the piezoelectric actuators as a housing means, as disclosed by DiMatteo, and have the cylindrical piezoelectric housing with a pair of electrodes for controlling the actuator attached to the inner and outer face of the

Art Unit: 2879

housing, as disclosed by Nishioka, in order to compensate for thermal effects of the first and second electrodes and maintain the performance of a sub-micron gap and also to provide an fine adjustment actuator that is not susceptible to variations in the voltage applied to the actuator while maintaining the ability to adjust the gap in three dimensions.

Regarding claim 4, Nishioka further teaches wherein the piezoelectric actuator has a circular cross section (Fig. 1, 2; Column 2, lines 54-55). Motivation to combine is the same as for claim 1.

Regarding claim 5, Fitzpatrick further discloses wherein the first and second electrodes are a matched pair (page 924, both electrodes are flat).

Regarding claim 8, Fitzpatrick further discloses wherein the first electrode is in thermal contact with a heat source, and said second electrode is in thermal contact with a heat sink, and said electrical circuit connects said first and second electrodes to an electrical load (page 920).

Regarding claim 9, Fitzpatrick teaches wherein the first electrode is in thermal contact with a heat source, and said second electrode is in thermal contact with a heat sink, and said electrical circuit connects said first and second electrodes to an electrical load (page 920). Fitzpatrick fails to teach wherein the first and second electrodes are connected to a power supply. However, one of ordinary skill in the art would reasonably contemplate connecting the first and second electrodes to a power supply in order to use the invention of Fitzpatrick as a heat pump since it is the inverse function of the device as a power supply. Therefore, it would have been obvious to one of ordinary skill

Art Unit: 2879

in the art to modify the invention of Fitzpatrick by connecting the first and second electrodes to a power supply in order to use the invention as a heat pump.

Regarding claims 10 and 11, Fitzpatrick further discloses wherein said diode device is both a thermionic converter and a gap diode (page 924).

Regarding claim 12, DiMatteo further teaches wherein the magnitude of a distance separating said electrodes is 0.1 microns (100nm) (Column 1, lines 23-25). Motivation to combine is the same as for claim 1.

Claim 3 is rejected under 35 U.S.C. 103(a) as being unpatentable over Fitzpatrick et al. ("Close-Spaced Thermionic Converters with Active Spacing Control and Heat-Pipe Isothermal Emitters"), DiMatteo et al. (US 6232546), and Nishioka et al. (US Pat. No. 4,880,975) in view of Johnston (US Pat. No. 3,600,933).

Regarding claim 3, Fitzpatrick, DiMatteo, and Nishioka teach the invention of claim 2 and wherein the piezoelectric actuator is a ceramic (Nishioka: Column 3, lines 3-5), but fail to teach wherein the piezoelectric actuator is quartz. Johnston teaches wherein a tubular piezoelectric actuator is quartz or a ceramic (Column 2, lines 69-72), thus exemplifying recognized equivalent materials for piezoelectric actuators. Accordingly, it would have been obvious to one of ordinary skill in the art to have the piezoelectric actuator of Fitzpatrick, DiMatteo, and Nishioka be quartz, instead of a ceramic, since the selection of these known equivalents would be considered within the level of ordinary skill in the art as evidenced by Johnston's teaching.

Claim 6 is rejected under 35 U.S.C. 103(a) as being unpatentable over Fitzpatrick et al. ("Close-Spaced Thermionic Converters with Active Spacing Control and Heat-Pipe Isothermal Emitters") (of record), DiMatteo et al. (US 6232546), and Nishioka et al. (US Pat. No. 4,880,975) (of record) in view of Tavkhelidze et al. (WO 99/13562) (of record).

Regarding claim 6, Fitzpatrick, DiMatteo, and Nishioka teach the invention of claim 1, but fail to teach wherein the first electrode comprises titanium. Tavkhelidze teaches wherein the first electrode is titanium and the second electrode is aluminum in order to prevent thermal expansion of the electrodes from causing the electrodes to touch (Page 16, lines 29-40). Therefore, it would have been obvious to one of ordinary skill in the art to modify the invention of Fitzpatrick, DiMatteo, and Nishioka to have the first electrode be titanium and the second electrode be aluminum in order to prevent thermal expansion of the electrodes from causing the electrodes to touch, as disclosed by Tavkhelidze.

Claim 7 is rejected under 35 U.S.C. 103(a) as being unpatentable over Fitzpatrick et al. ("Close-Spaced Thermionic Converters with Active Spacing Control and Heat-Pipe Isothermal Emitters") (of record), DiMatteo et al. (US 6232546), and Nishioka et al. (US Pat. No. 4,880,975) (of record) in view of Edelson (US 5994638).

Regarding claim 7, Fitzpatrick, DiMatteo, and Nishioka teach the invention of claim 1, but fail to teach wherein the second electrode comprises silver. Edelson teaches wherein both the first and second electrodes are silver in order to provide low

Art Unit: 2879

work function electrodes and have a high current density (Column 6, lines 16-20).

Therefore, it would have been obvious to one of ordinary skill in the art to modify the invention of Fitzpatrick, DiMatteo, and Nishioka to have the electrodes be silver in order to provide low work function electrodes and have a high current density, as disclosed by Edelson.

Allowable Subject Matter

Claims 13 and 15-26 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

Response to Arguments

Applicant's arguments filed August 8, 2006 have been fully considered but they are not persuasive.

With regard to claims 1 and 2, Applicant argues that the reference DiMatteo does not disclose a housing and that the piezoelectric elements disclosed by DiMatteo are disposed outside the an unlabelled (in DiMatteo) housing element and are therefore not a housing. Applicant further argues that there is no obvious teaching, suggestion, or motivation in the references for having a housing means as both housing and distance controller is advantageous and that if a reasonable expectation of success existed, DiMatteo (to whom both Fitzpatrick and Nishioka were available) would have used the cylindrical housing of Nishioka as both housing and distance controller.

The Examiner respectfully disagrees. Claims 1 and 2 do not require that the entire housing surrounding the diode device be composed of a piezoelectric housing element but that the diode device has a "housing means" wherein "said housing means comprises a means whereby the magnitude of a distance separating said electrodes may be adjusted" with "a further pair of electrodes attached to an inner and outer face of said housing means...whereby a length of said housing means may be modified by a signal applied to said further pair of electrodes" (claim 1) and "wherein said means whereby the magnitude of a distance separating said electrodes may be adjusted comprises a piezoelectric actuating element" (claim 2). Thus, the housing means need only 'comprise' a piezoelectric actuating element that adjusts the magnitude of a distance separating the electrodes of the diode device, which does not prevent the 'housing means' from comprising other elements. Further, in response to applicant's arguments against the references individually, one cannot show nonobviousness by attacking references individually where the rejections are based on combinations of references. See *In re Keller*, 642 F.2d 413, 208 USPQ 871 (CCPA 1981); *In re Merck & Co.*, 800 F.2d 1091, 231 USPQ 375 (Fed. Cir. 1986). In response to applicant's argument that if the invention was obvious at the time of DiMatteo's invention then DiMatteo would have invented it, the Examiner points out that 35 U.S.C. § 103(a), under which the current rejection is given, does not require that the prior art disclose the identical invention claimed but that the differences between the prior art and the claimed invention are such that the subject matter as a whole would have been obvious to one of ordinary skill in the art.

Art Unit: 2879

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Anne M. Hines whose telephone number is (571) 272-2285. The examiner can normally be reached on Monday through Friday from 8:00-4:30.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Nimesh Patel can be reached on (571) 272-2457. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

Anne M Hines
Patent Examiner
Art Unit 2879

AMH
8/18/06

MS
MARICELI SANTIAGO
PRIMARY EXAMINER